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RF Radiation Exposure Evaluation

In accordance with:

CFR47 FCC Part 2, Subpart J, 2.1093

FCC KDB 447498 D01 v06

Powerpal Pty Limited

PPL-002

Powerpal

FCC ID: 2A5SI-PPL002

REPORT: E2202-1515-6

DATE: May, 2022

RF Radiation Exposure Evaluation Report

EMC Bayswater Test Report: E2202-1515-6
Issue Date: May, 2022

Product:	Powerpal
Model No:	PPL-002
Serial No:	0000d218
FCC ID:	2A5SI-PPL002

Client Details:
Mr Peter Neal
Powerpal Pty Limited
S1 L1 424 St Kilda Rd,
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Australia
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e-mail: pete@powerpal.net

Standard(s):
CFR47 FCC Part 2, Subpart J, 2.1093
Radiofrequency radiation exposure evaluation: portable devices.

FCC KDB 447498 D01 v06
RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

Results Summary: RF Radiation exposure requirements ***Complied***

Test Date(s): 25th March 2022

Test House (Issued By)
EMC Bayswater Pty Ltd
18/88 Merrindale Drive
Croydon South
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FCC Accredited Test Firm Registration number: 527798
FCC Accredited Test Firm Designation number: AU0004

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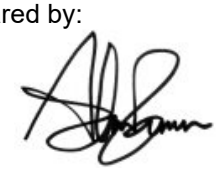
The Powerpal Pty Limited, PPL-002, Powerpal, measured EIRP is below the SAR exception threshold (60mm distance) and the calculated power density level at a distance of 20cm are below the maximum levels allowed by regulations therefore complied with the requirements of CFR47 FCC Part 2, Subpart J, 2.1093.

This is to certify that the necessary evaluations were made by EMC Bayswater Pty Ltd, and that the Powerpal Pty Limited, PPL-002, Powerpal, has been tested in accordance with requirements contained in the appropriate commission regulations.

Prepared by:	Approved by:	
		27/05/2022 16:35
Adnan Zaman (EMC Test Engineer)	Neville Liyanapatabendige (Manager)	Date

RF Radiation Exposure Evaluation
for
Powerpal Pty Limited

Contents

1. Introduction

RF Radiation Exposure evaluation was performed on a Powerpal Pty Limited, PPL-002, Powerpal in accordance with CFR47 FCC Part 2, Subpart J, 2.1093.

2. Test Report Revision History

None

3. Report Information

EMC Bayswater Pty Ltd reports apply only to the specific samples tested under the stated test conditions. All samples tested were in good operating condition throughout the entire test program unless otherwise stated. EMC Bayswater Pty Ltd does not in any way guarantees the later performance of the product/equipment. It is the manufacturer's responsibility to ensure that additional production units of the tested model are manufactured with identical electrical and mechanical components. EMC Bayswater Pty Ltd shall have no liability for any deductions, inference or generalisations drawn by the clients or others from EMC Bayswater Pty Ltd issued reports. This report shall not be used to claim, constitute or imply product endorsement by EMC Bayswater Pty Ltd. This report shall not be reproduced except in full, without the written approval of EMC Bayswater Pty Ltd. This document may be altered or revised by EMC Bayswater Pty Ltd personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by EMC Bayswater Pty Ltd will nullify the document.

4. Product Details

4.1. Product Sample Details

The device, as supplied by the client, is described as follows:

Product:	Powerpal	
Model No:	PPL-002	
Serial No:	0000d218	
Firmware:	1.0.0	
Software:	N/A	
Power Specifications:	3 VDC (2x1.5V AA Alkaline batteries)	
Dimensions:	80mm x 55mm x 18mm (Length x Width x Height)	
Weight:	100g	
EUT Type:	Portable, tested as table-top	
Transmitter details:	Description:	Powerpal
	Type:	Bluetooth Low Energy
	Modulation:	GFSK
	Channels:	40
	Max power:	20dBm
	Antenna:	PCB Trace
	FCC ID:	2A5SI-PPL002
	IC:	28339-PPL002
	CE mark	Yes
	RCM Logo	Yes

(Customer supplied product information)

4.2. Product description

The device has been described by the customer as follows:

“The product logs optical pulse outputs from digital electricity meters (typically generated by a flashing LED on the face of the meter) where each pulse represents a unit of energy consumed. This data is then exposed over a wireless BLE connection for receipt by a companion mobile phone app.

The sensor end of the product is attached to the front of the electricity meter (over the optical pulse output) using adhesive brackets and is magnetically attached to the top of the meter cabinet that contains the meter being monitored.”

(Customer supplied product description information)

5. SAR and RF Exposure exception evaluation

5.1. SAR exception evaluation

As per Appendix A of KDB 447498 D01 General RF Exposure Guidance v06

***SAR Test Exclusion Thresholds* for 100 MHz – 6 GHz and > 50 mm**

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

MHz	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
150	387	397	407	417	427	437	447	457	467	477	487	497	507	517	527	
300	274	294	314	334	354	374	394	414	434	454	474	494	514	534	554	
450	224	254	284	314	344	374	404	434	464	494	524	554	584	614	644	
835	164	220	275	331	387	442	498	554	609	665	721	776	832	888	943	
900	158	218	278	338	398	458	518	578	638	698	758	818	878	938	998	
1500	122	222	322	422	522	622	722	822	922	1022	1122	1222	1322	1422	1522	mW
1900	109	209	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	
2450	96	196	296	396	496	596	696	796	896	996	1096	1196	1296	1396	1496	
3600	79	179	279	379	479	579	679	779	879	979	1079	1179	1279	1379	1479	
5200	66	166	266	366	466	566	666	766	866	966	1066	1166	1266	1366	1466	
5400	65	165	265	365	465	565	665	765	865	965	1065	1165	1265	1365	1465	
5800	62	162	262	362	462	562	662	762	862	962	1062	1162	1262	1362	1462	

SAR test exclusion threshold for 2402MHz transmitter is 197.01mW for 60mm distance.

- The measured maximum EIRP is 134.8mW (Worst-case, Without Duty Cycle correction factor).

The measurement uncertainty was calculated at ±4.83dB. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of approximately k=2 which gives a level of confidence of approximately 95%.

The measured EIRP is below the SAR exception threshold for 60mm distance.

As specified by the customer the minimum separation distance between the user and the radiating element of the device is greater than 20cm (the device is installed on electricity meters).

5.2. RF Exposure Evaluation (MPE)

As per section 1.1310 of CFR 47 following Maximum Permissible Exposure (MPE) limits are applicable.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

Limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields for 2402 to 2480MHz as per Table 1 of Section 15.1310 is 1 mW/cm^2 (General Population/Un-controlled).

Prediction Worst case:

Using equation

$$S = PG / 4\pi R^2$$

where: S = Power density
P = Power input to the antenna
G = Antenna gain
R = Distance to the center of radiation of the antenna

Band	Maximum EIRP (dBm)	Maximum EIRP (mW)	Distance (cm)	Calculated Power Density at 20cm (mW/cm^2)	Power Density Limit** (mW/cm^2)
2.4GHz BLE	21.2	134.8	20	0.0268	1

**Worst-case, Without Duty Cycle correction factor*
*** MPE limit for General Population/Un-controlled exposure*

Table 1: Results for MPE Evaluation

6. Conclusion

The measured EIRP is below the SAR exception threshold (60mm distance) and the calculated power density level at a distance of 20cm are below the maximum levels allowed by regulations.